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ECONOMIC COMMISSION FOR ASIA AND THE FAR EAST.

Committee for Coordination of Investigations
of the Lower Mekong Basin.

(Cambodia, Laos, Thailand and Viet-Nam)

REPORT ON THE TRIP TO MEKONG RIVER MAIN-STEM AND TRIBUTARY PROJECTS

by

S. Ichiura

Report on the Trip to Mekong River Main Stem
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1. The purpose of this trip is to make field inspection of four main stem damsites namely upper Pakse, lower Pakse, Khemarat and Thakhek, and three tributary projects namely the Mune, Huey Ban Sai and Nam San from engineering and geological [1]/ point of view. The last project Nam San, however, was inaccessible, because of bad road from Loei.

Land and river transportations were provided by National Energy Authority, Government of Thailand from Ubol to Khon Kaen about 1,400 km in total. An aluminum boat contributed by the United States was used to travel the river.

2. Itinerary

Sun.	18.10.64	1st day	Lv. Bangkok 19.30 by train
Mon.	19.10.64	2nd day	Arr: Ubol make arrangement for boat
Tues	20.10.64	3rd day	Lv. Ubol for Ban Dan Arr. 19.30
Wed.	21.10.64	4th day	Visit the Mune river damsite and lower and upper Pakse damsite. Stay Ban Dan overnight.
Thur.	22.10.64	5th day	Lv. Ban Dan Arr. Khemarat
Fri.	23.10.64	6th day	Inspect Khemarat damsites Arr. Mukdahan
Sat.	24.10.64	7th day	Visit Mukdahan gauging station on NEA office stay overnight
Sun.	25.10.64	8th day	Lv. Mukdahan Visit Huey Bang Sai damsite and Thakhek damsite Arr. Sakorn Nakhon stay overnight
Mon.	26.10.64	9th day	Lv. Sakorn Nakhon Visit Nam Pung Dam under construction Arr. Khon Kaen
Tues.	27.10.64	10th day	Visit Nam Pong project under construction stay Khon Kaen overnight

1/ Geological report is submitted by Mr. Allen H. Nicol (c.f. WRD/MKG/INF/L.139. 19 November 1964) who joined our trip.

Wed.	28.10.64	11th day	Lv. Khon Kaen Arr. Loei, inspect the road to Nam San site stay overnight
Thur.	29.10.64	12th day	Lv. Loei Arr. Bangkok 23.00 by car.

3. Field investigation report

1. Nam Mune project (c.f. Fig. 1)

Nam Mune project is located on the Nam Mune river, 6 kilometers upstream from the confluence with main stream. This is a multiple-purpose project for power, navigation and irrigation. High water level of this project is 110 m above seal level and height of the dam will be about 30 m from the river bed. Length of crest of the dam will be at least 350 m by the map surveyed by NEA engineers. Both banks expose rock outcrops of sandstone upwards from the place several metres high from the river banks. Depth of bed rock foundation is not known at present stage but this site indicates that concrete gravity dam would be designed and constructed without much difficulties if the river bed is not so deep. NEA made geophysical investigations at the site on both banks of the river. This test shows that over-burden is deep about 7 meters at 110 m level.

The basic problem is the relation between this project and Pakse dam. Present location of Pakse dam site is proposed below the confluence of the Mune and main stem of the Mekong with the reservoir level of 108 m above sea level. As the high water level of the Mune project is 110 m as stated before, only 2 metre difference would be existing between two reservoirs. It means that these two projects can not be consistent with each other. If the Mune River project has to be built, the Pakse dam should be moved upstream from the confluence. But from pure engineering stand point it is much more economical to build one dam on the main stem at the downstream side of the confluence. Anyway, some coordination should be made between Thai Government and Mekong Committee to stabilize the basic consideration of these two projects.

2. Pakse dam site (c.f. Fig. 1)

We visited Pakse dam site both downstream and upstream sites. Original location is the former one and there are a few sites about 4 kilometres downstream from the confluence where the river width are only 250-300 m.

(c.f. Fig.1) with good sandstone abutments on both banks. However required length of spillway to evacuate maximum flood flow would be at least 600 m, so these sites are too narrow for it.[1/] However it is not difficult to find wider section near this area to build about 25 m high dam with favourable foundation rock near Laos-Thailand border.

Pakse upstream site is almost the same situation with the downstream ones. Islands and shoals in the map were all submerged by flood water when we visited the site. However some good damsites would be available also in this area. Upper Pakse No. 2 dam site looks good having favourable conditions, if foundation rock is suitable.

3. Khemarat dam site (c.f. Fig.2)

Khamarat was the most difficult site to access. Boat trip from the town of Khemarat to the proposed dam site was inadequate because of dangerous rapids between these two locations. We had to drive our Landrover to the small village Wat Si Chan and carry aluminum boat by jeep to inspect the damsite from downstream side.

Almost all island shoals and rapids indicated in the maps were disappeared because of flood flow. We went upstream by boat from Wat Si Chan to the mouth of small tributary Se Bang Nouau and found favaourable site for the dam (No. 3) at the corner of big bend of the Mekong river.

1/ Maximum design flood for Pakse would be at least 50,000 m^3/s and if we assume the depth of spillway gate at 15 m., 1. width of this gate can spill about

$$Q = CBH^{\frac{3}{2}} = 2.0 \times 15^{\frac{3}{2}}$$

$$= 2.0 \times 58 = 116\ m^3/s$$

Width required for 50,000 m^3/s

$$50{,}000 : 116 = 430$$

including spillway piers, lock and other facilities width of the main stream dam would be 550-600 m order.

It must be noted that this calculation does not take the effect of river stage of flood flow into account.

From No. 1 to No. 3 all damsites look no big difference among them. No. 1 site has narrowest width but some foundation problems may occur because the rock bedding is parallel to the river channel dipping to the right bank. This formation might cause deep foundation on the right bank and leakage through sandstone strata. No. 2 site has wider width and lower bank elevation than No. 1 site which may result larger volume of concrete for the dam but dipping and strike of the foundation rock is more favourable than No. 1. No. 3 site is just at the corner of the big bend which may cause difficulty in designing spillway, lock and power house through foundation rock looks fine. It is necessary to make further investigation in dry season for this area in order to make final dicision of the dam site. Landing area just downstream of No. 1 damsite shows most favourable rock foundation. It would be also a good site if length of dam is enough for it.

4. Mukdahan Gauging station

We visited Mukdahan gauging station on 24 October 1964. This is one of the most important stations on the main stem and seems well maintained and properly taken care of by NEA. Staff gauge reading was 6.31 m. at that time and the river flow will be 11,400 m^3/s according to the stage flow curve.

5. Huey Bang Sai dam site (c.f. Fig.3)

This site is on the small tributary of the Mekong near Mukdahan and about 7 kilometres from Ban Kham Plan Lai along Highway 33.

Cars are not accessible except about one kilometres from the highway. We could inspect the site of the dam only from the left bank where higher portion exposes good sandstone. Near the river bank mostly covered with silt, the width of the river was about 10 metres and deepest portion about 5 metres according to the information of a fisherman living nearby. We estimated the flow at 30 m^3/s by eye measurement.

The proposed dam is about 30 m high and it would not be difficult to build such comparatively low dam due to the outcrop of sandstone on the left bank. More detailed survey and investigation would be required to proceed this project and access road should be built to do so.

6. Thakhek dam site (c.f. Fig 4)

Because of the Joop trouble which transports the boat, we could not inspect

the Thakhek damsite by boat so we did only from the right bank by car. The site is about 11 kilometres from Thakhek. This area is low on both banks, it is very clear by 1:20,000 scale map and main highway is running along the right bank, and paddy field and farmers' houses are located in large scale on this bank. Difference of level between right bank and the river was 7 metres by simple hand level measurement at the proposed dam site. If we build a dam at this section raising water level up to 145 m most of the farmland and houses near banks would be flooded. However site for Thakhek is very much restricted because of the topography and to my judgement it will be very difficult to find other alternative site in this area. River is comparatively flat slope here and overburden looks likely thick, therefore, more detailed topographical and geologic investigation should be carried out before final decision would be made.

7. Nam San damsite.

Nam San project is situated on the Nam San river, a small tributary of the Mekong near Loei. The proposed damsite is about 70 kilometre from Loei, however, we were not able to access the site, because the road leading to Nam San river was land-slided.

8. Conclusions and recommendations

Main stem projects - The time we have visited these sites, was just after the rainy season, therefore, water levels of the rivers were extremely high, in other w rds, were in flood stage. In this connection, it was rather easy to travel the river because some rapids, shoals and islands which would make difficult to pass in dry season were disappeared under water. On the other hand, however, it was very difficult to inspect river bank and foundation conditions which would be exposed in dry season, as a result every dam sites look very similar each other and were difficult to identify the best one. Though we had some difficulties, we could inspect river flow conditions in flood season, general topography and general geologic pictures. However, it is strongly recommended that field inspection trip in dry season should be made in order to make final decision of the main stream dam sites and at the same time to make close coordination with National Energy Authority to solve the basic Mune-Pakse problem.

As for other tributaries further detailed investigation should be madefor the evaluation of the projects.

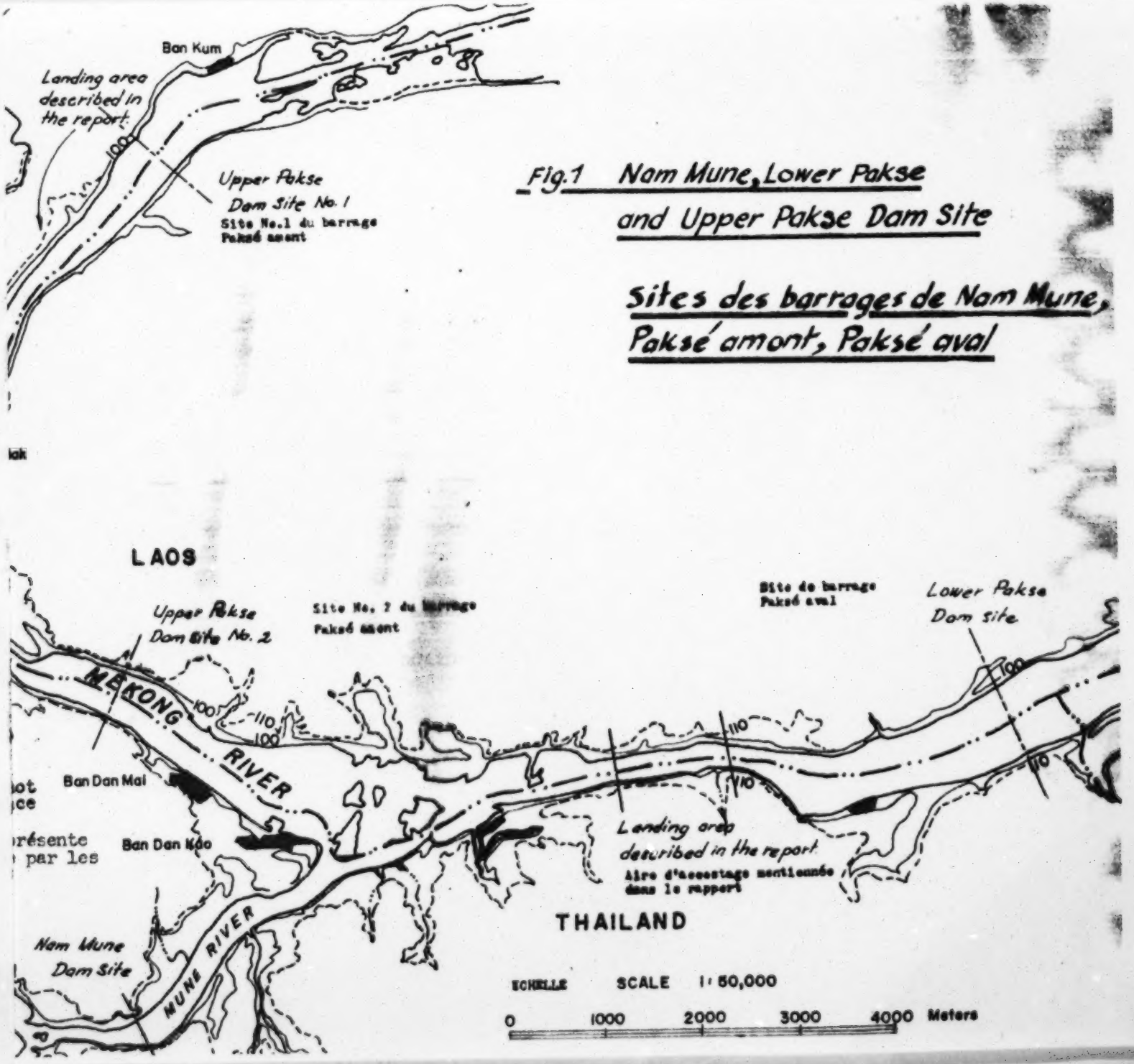

Ban Kum
Landing area described in the report
Upper Pakse Dam Site No. 1
Site No.1 du barrage Paksé amont
LAOS
Upper Pakse Dam Site No. 2
Site No. 2 du barrage Paksé amont
Site de barrage Paksé aval
Lower Pakse Dam site
MEKONG RIVER
Ban Dan Mai
Ban Dan Kao
Landing area described in the report
Aire d'accostage mentionnée dans le rapport
THAILAND
Nam Mune Dam Site
MUNE RIVER
ECHELLE SCALE 1: 50,000
0 1000 2000 3000 4000 Meters

Fig.1 Nam Mune, Lower Pakse and Upper Pakse Dam Site

Sites des barrages de Nam Mune, Paksé amont, Paksé aval

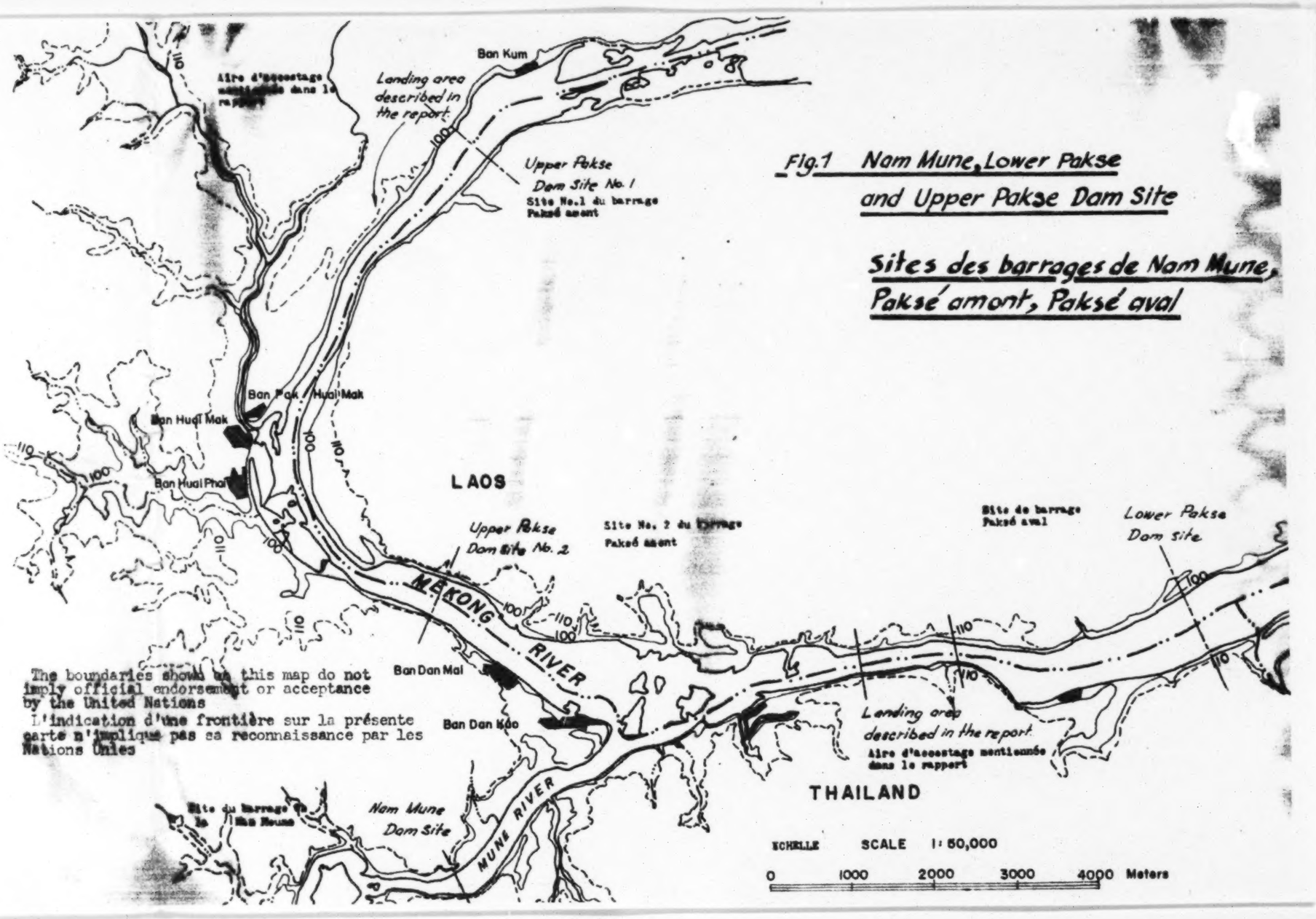
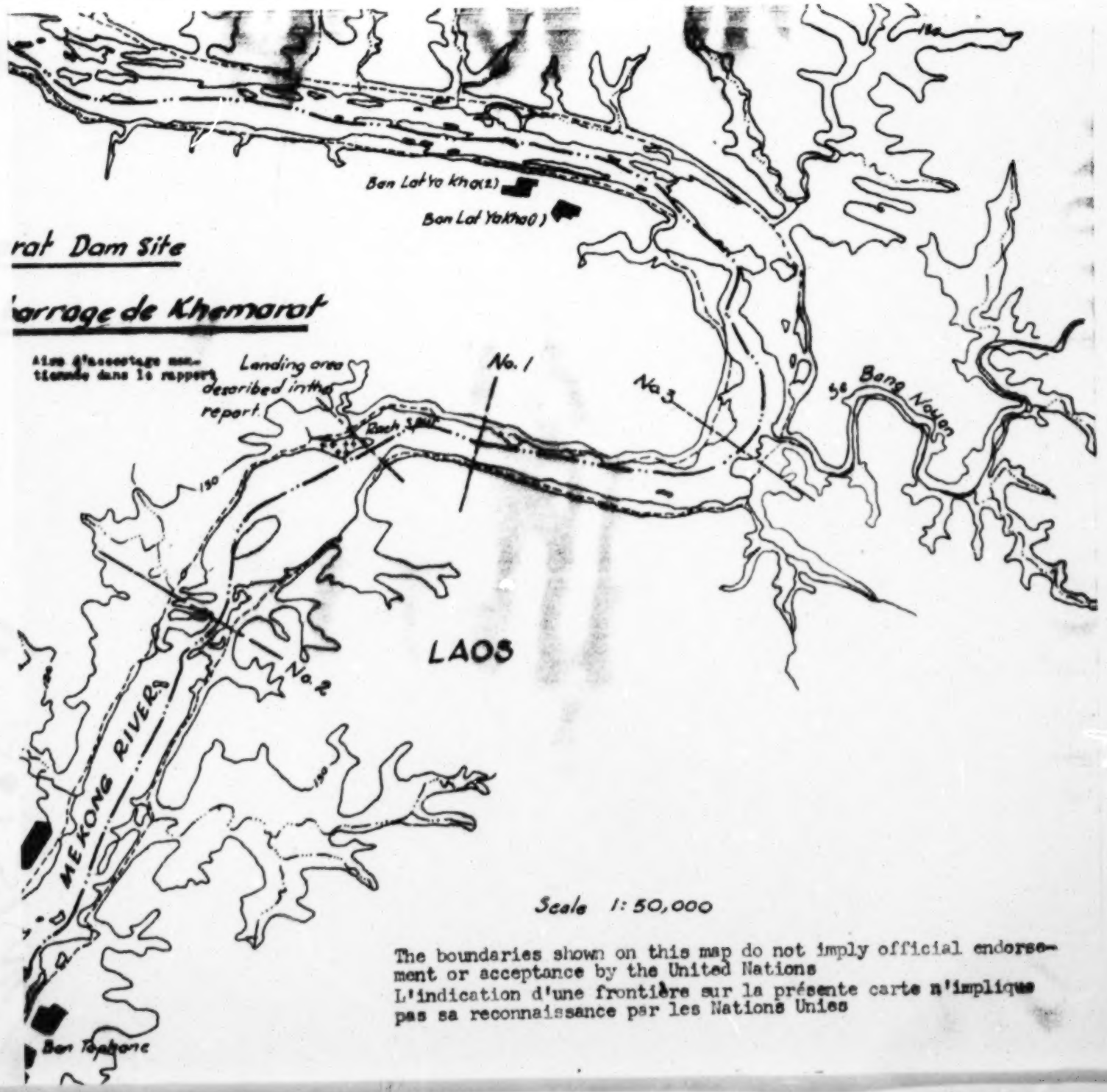

Ban Kum
Landing area described in the report
Upper Pakse Dam Site No. 1
Site No.1 du barrage Paksé amont
Ban Pak Huai Mak
Ban Huai Mak
Ban Huai Phai
LAOS
Upper Pakse Dam Site No. 2
Site No. 2 du barrage Paksé amont
Site de barrage Paksé aval
Lower Pakse Dam site
MEKONG RIVER
Ban Dan Mai
Ban Dan Kéo
Landing area described in the report
Aire d'accostage mentionnée dans le rapport
THAILAND
Nam Mune Dam Site
MUNE RIVER
The boundaries shown on this map do not imply official endorsement or acceptance by the United Nations
L'indication d'une frontière sur la présente carte n'implique pas sa reconnaissance par les Nations Unies
ECHELLE SCALE 1: 50,000
0 1000 2000 3000 4000 Meters

Fig.1 Nam Mune, Lower Pakse and Upper Pakse Dam Site

Sites des barrages de Nam Mune, Paksé amont, Paksé aval


Ban Lat Ya kha(2)
Ban Lat Yakha(1)
rat Dam Site
'arrage de Khemarat
Aire d'accostage mentionnée dans le rapport
Landing area described in the report
No. 1
No. 3
Ban Nayon
LAOS
No. 2
MEKONG RIVER
Ban Tapheng
Scale 1:50,000
The boundaries shown on this map do not imply official endorsement or acceptance by the United Nations
L'indication d'une frontière sur la présente carte n'implique pas sa reconnaissance par les Nations Unies

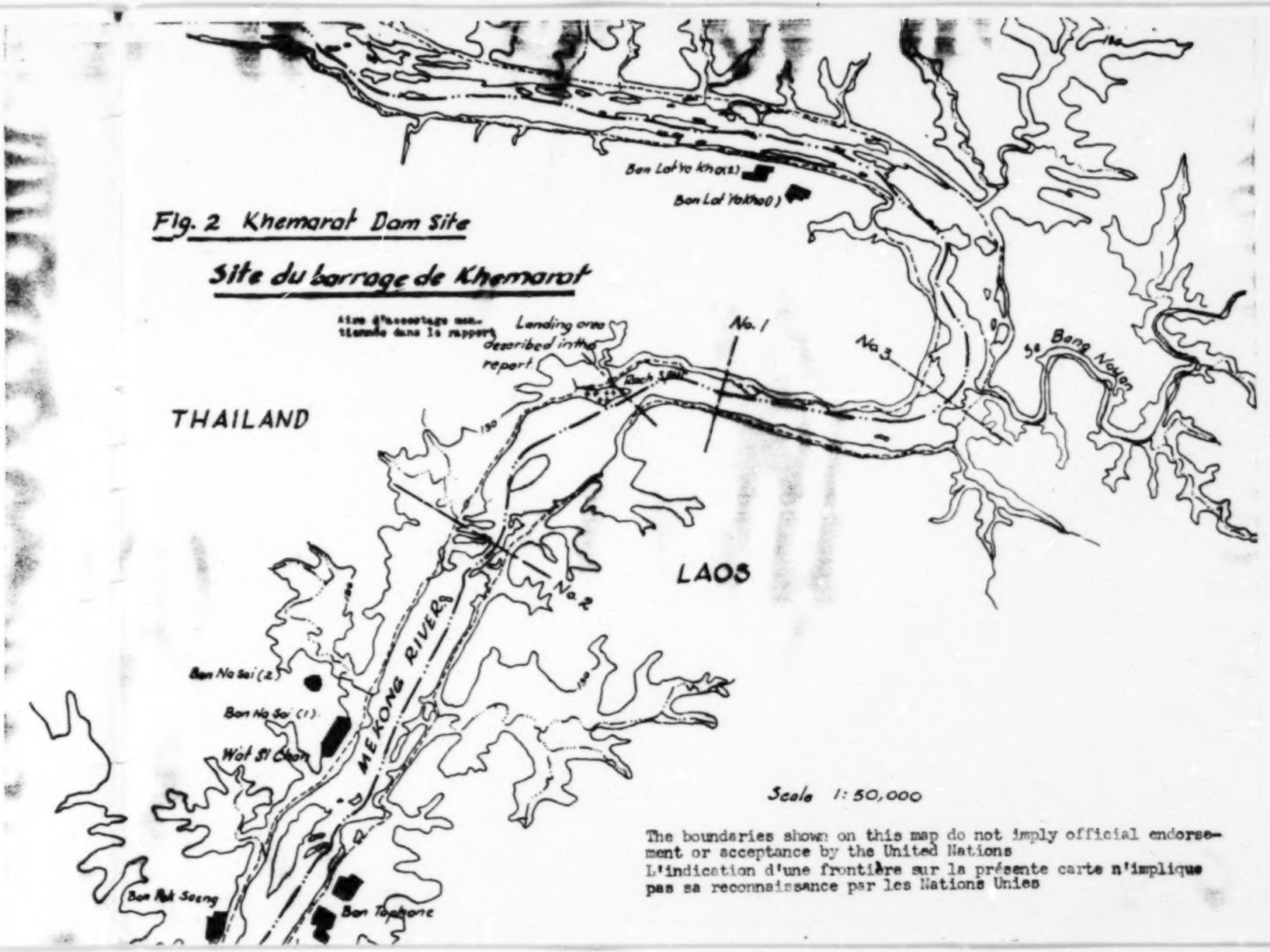


Fig. 2 Khemarat Dam Site

Site du barrage de Khemarat

Scale 1:50,000

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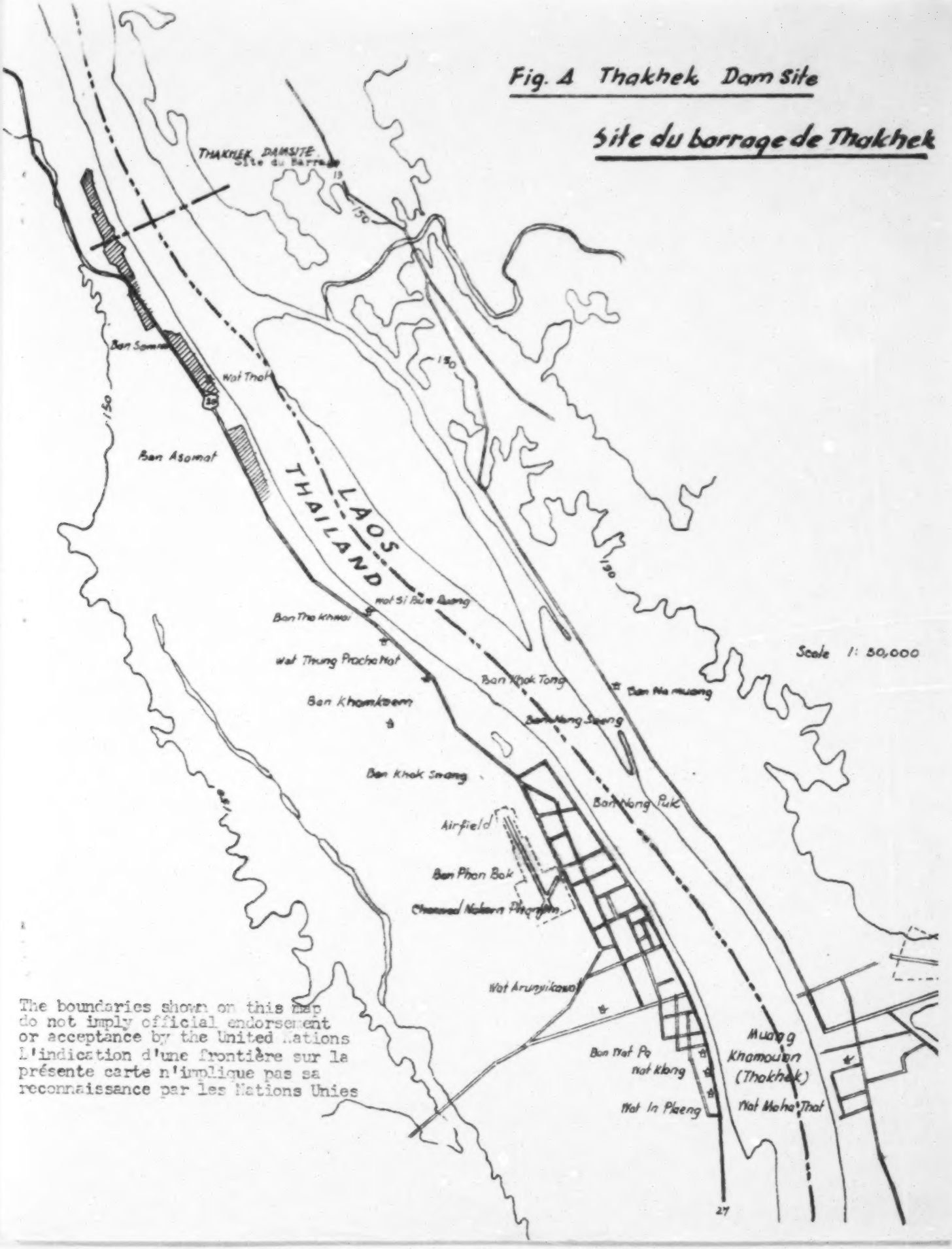
Fig. 3 Huai Bangsai
Dam Site
Scale 1: 50,000
Ban Kham Pla Lai
Site du barrage
de Houl Bang Sai
Huai Bang Sai Dam Site
HUAI BANG SAI
Mukdahan.
180
200
190
160
170

Fig. 4 Thakhek Dam Site

Site du barrage de Thakhek



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